US011352829B2

(12) **United States Patent**
McCoy et al.

(10) **Patent No.: US 11,352,829 B2**
(45) **Date of Patent: Jun. 7, 2022**

(54) **WINDOW ASSEMBLY HAVING FRAMELESS APPEARANCE AND REMOVABLE GLASS PANEL**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 16 days.

(21) Appl. No.: **17/001,545**

(22) Filed: **Aug. 24, 2020**

(65) **Prior Publication Data**

US 2022/0056753 A1 Feb. 24, 2022

(51) **Int. Cl.**
E06B 1/40 (2006.01)
E06B 1/34 (2006.01)

(52) **U.S. Cl.**
CPC ***E06B 1/40*** (2013.01); ***E06B 1/342*** (2013.01)

(58) **Field of Classification Search**
CPC ... E06B 1/04; E06B 1/36; E06B 1/363; E06B 1/366; E06B 1/38; E06B 1/702; E06B 3/5892; E06B 3/6621
USPC 52/204.1, 213, 215, 216
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,189,862	A *	3/1993	Lafleur	E06B 3/2605 52/204.593
5,893,600	A *	4/1999	McManus	E06B 3/38 296/146.16
8,484,902	B1 *	7/2013	Brown	E06B 3/26341 49/504
8,915,032	B1 *	12/2014	Rivera	E06B 1/363 52/204.595
2006/0248820	A1 *	11/2006	Silverman	E06B 3/5871 52/204.1
2008/0190030	A1 *	8/2008	Cheon	E06B 3/4609 49/425
2011/0010997	A1 *	1/2011	Kislov	E06B 9/02 49/141
2015/0121764	A1 *	5/2015	Lee	E05D 15/0682 49/420

* cited by examiner

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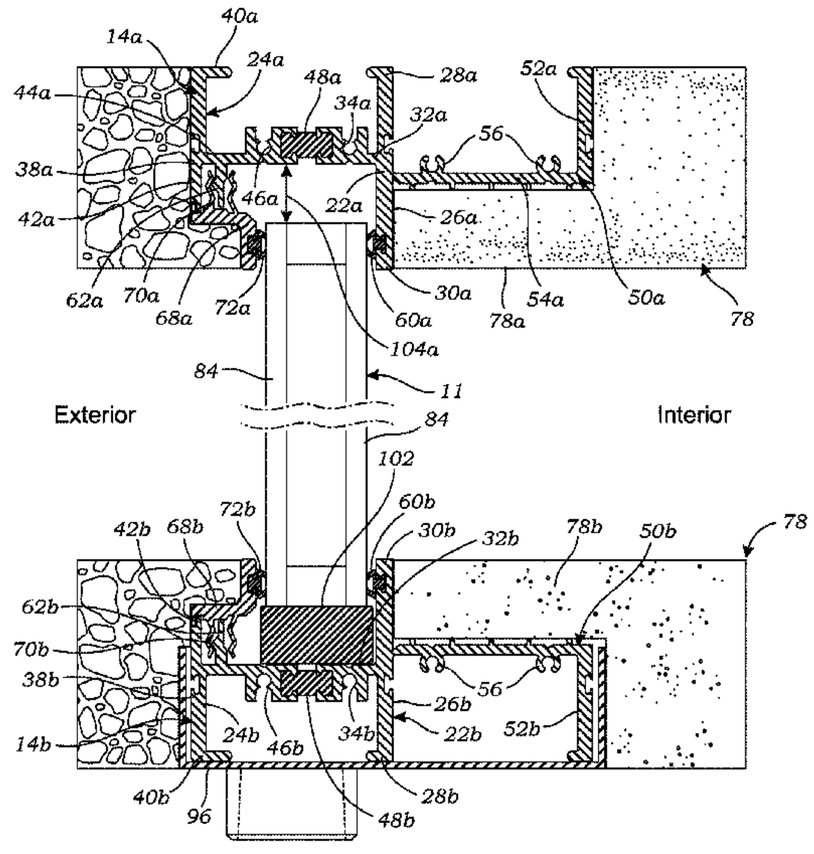
(57) **ABSTRACT**

A window assembly for installing in a window framing (also referred to as a "window casing") of a wall of a building. The window assembly is configured to have a frameless appearance when installed with the finish surround installed around the interior and/or exterior of the window. The window assembly also allows the glass panel to be removed with a minimum of removal of the finish surround, such as without removing any of the finish surround, or only removing the finish surround around several sides of the only one of the interior or exterior of the window. For example, in most cases, only the interior finish surround around the right side and left side of the installed window frame needs to be removed to remove and replace the glass panel. Furthermore, the window assembly includes an integrated drain for draining moisture which leaks into the window assembly.

24 Claims, 9 Drawing Sheets



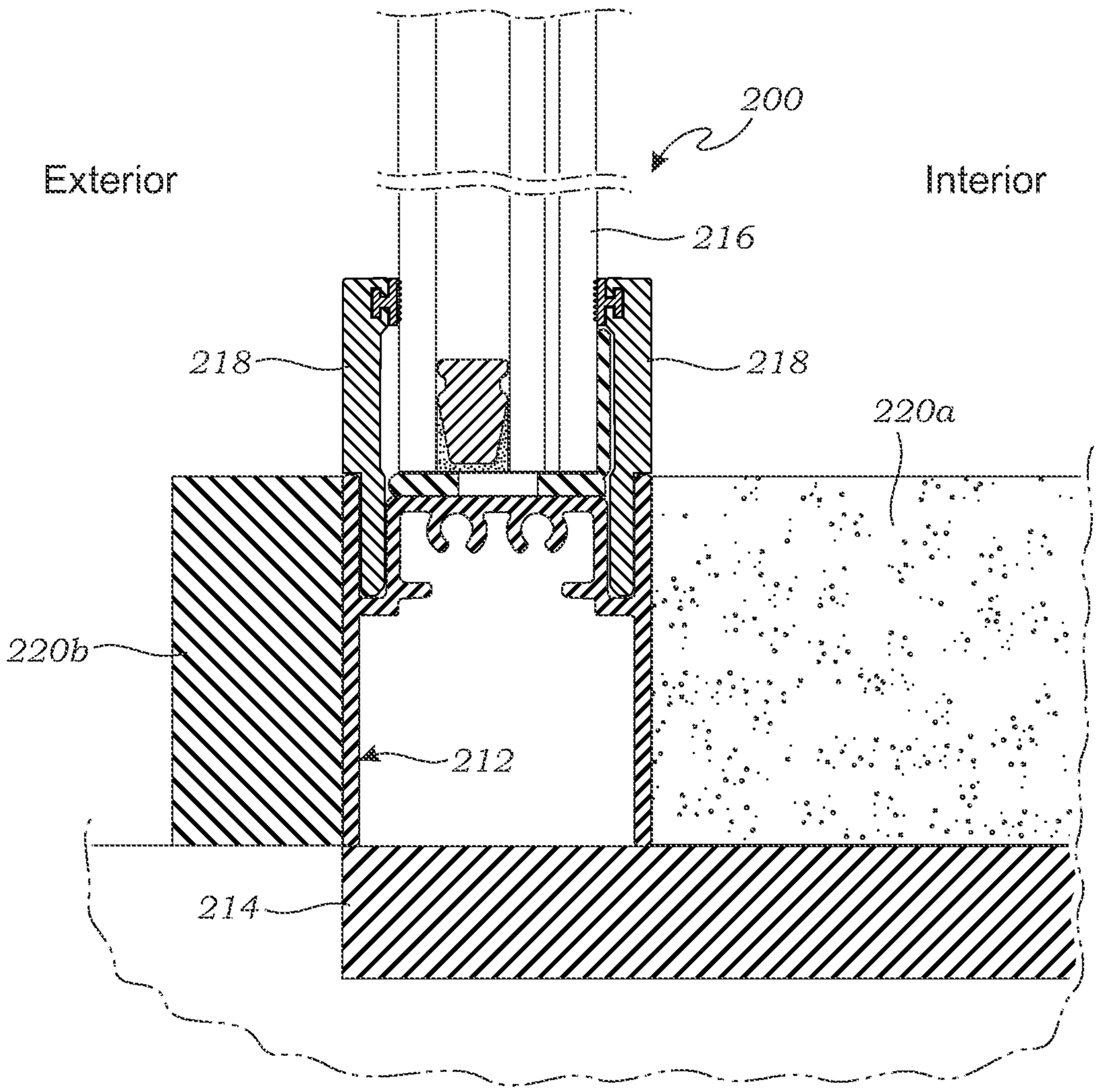


Fig. 1
(Prior Art)

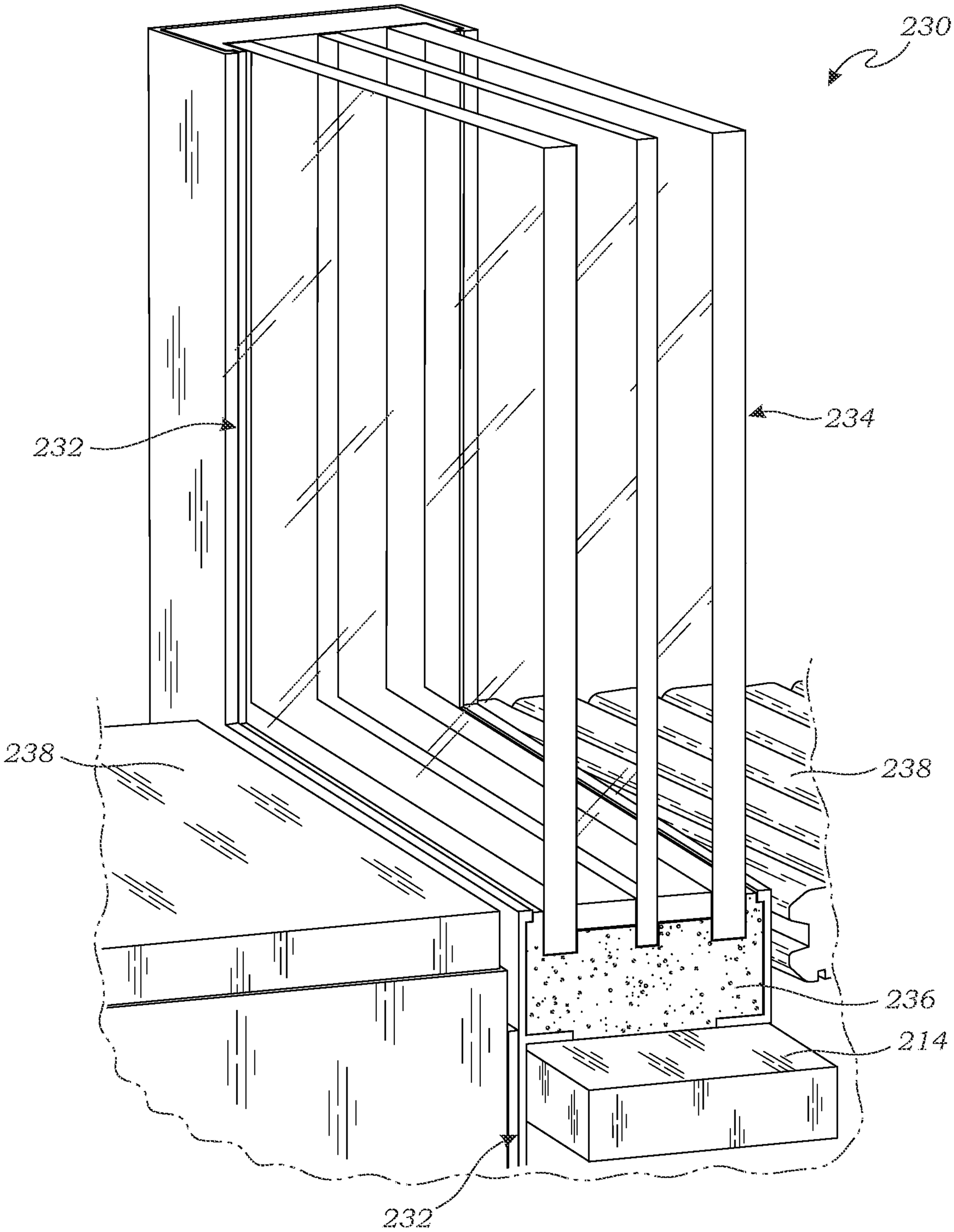


Fig. 2
(Prior Art)

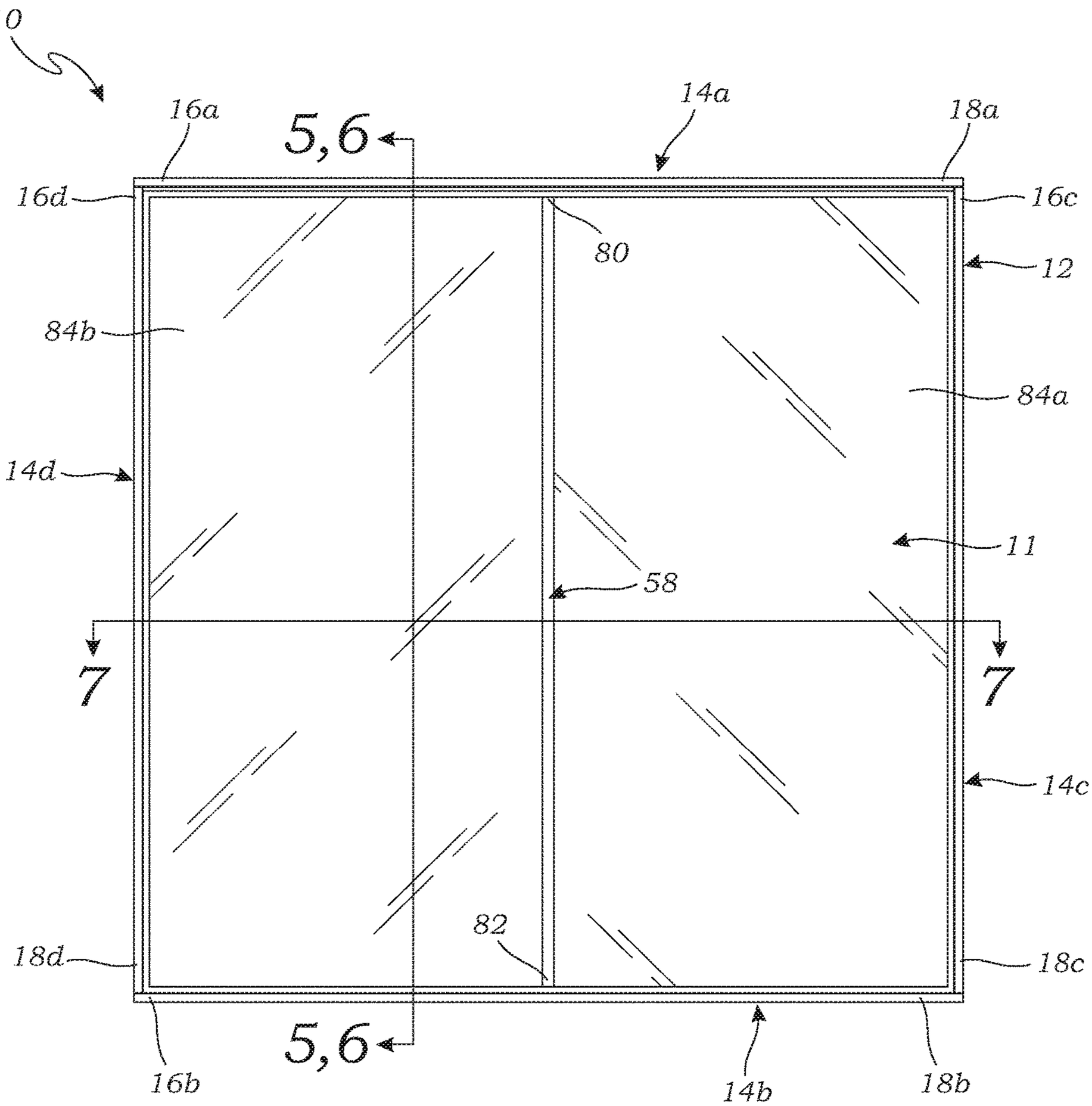

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Fig. 3

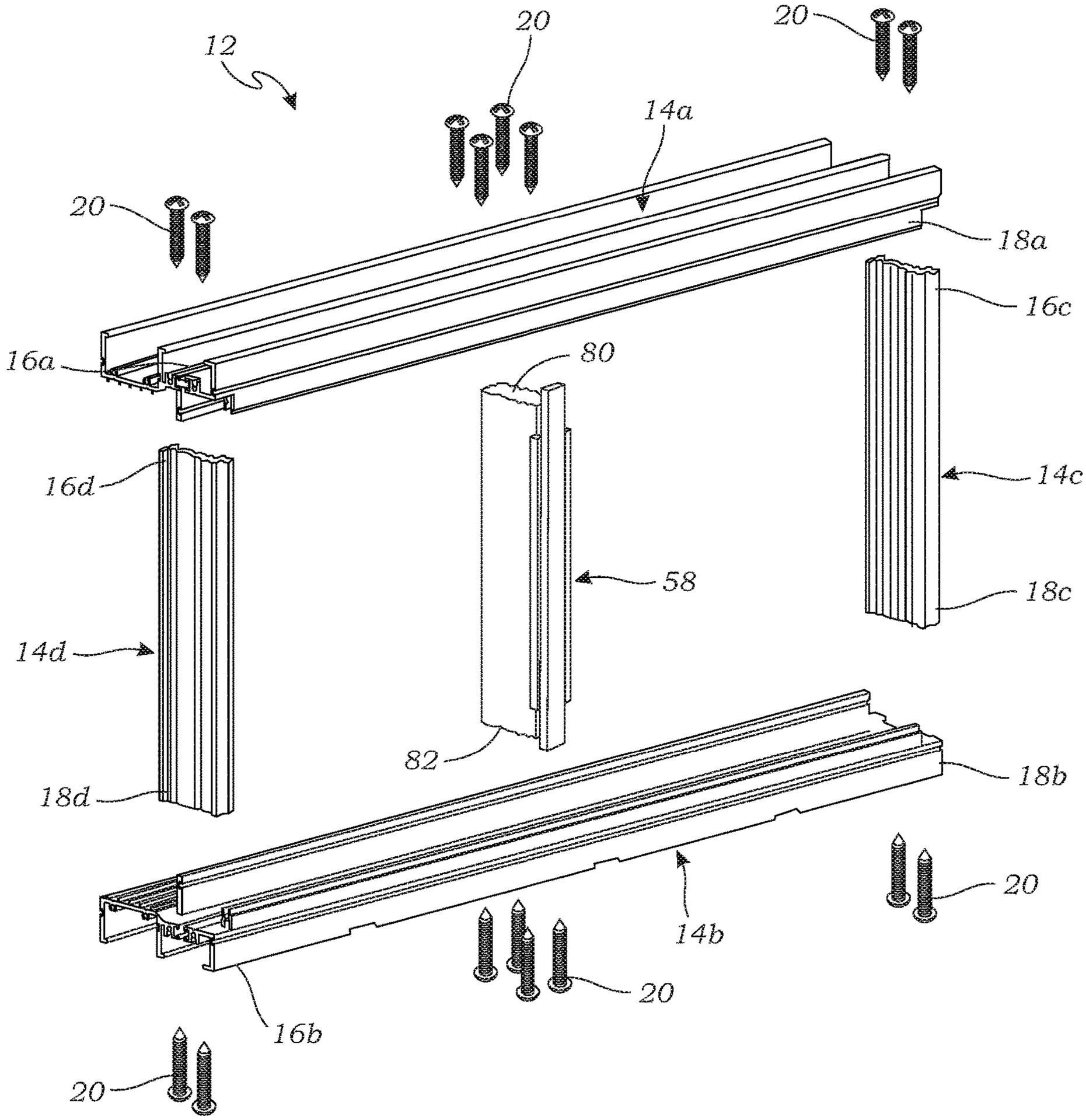
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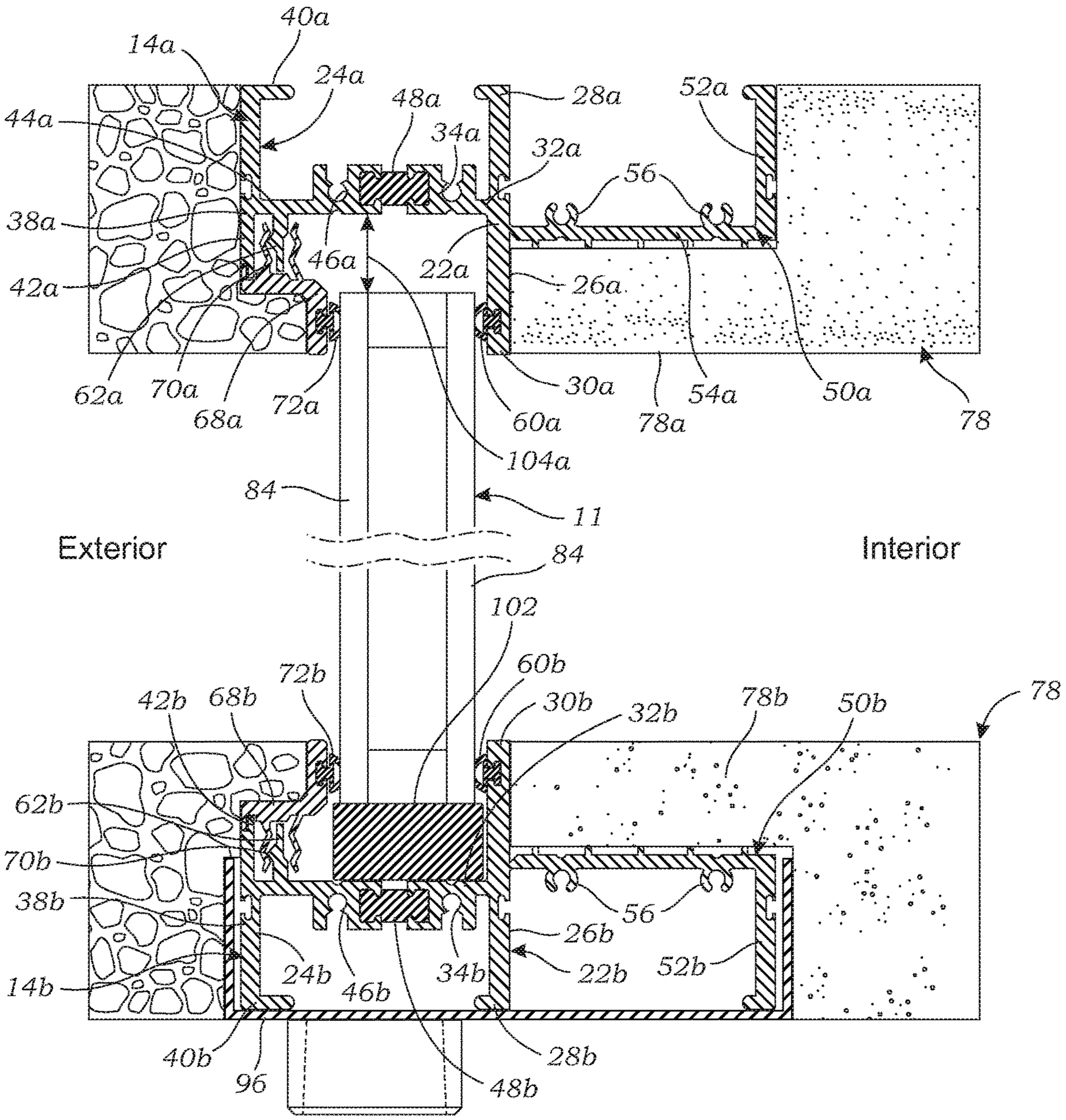
Fig. 4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60a
78a
104a
84
11
Exterior
Interior
84
102
72b
60b
42b
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30b
32b
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50b
78
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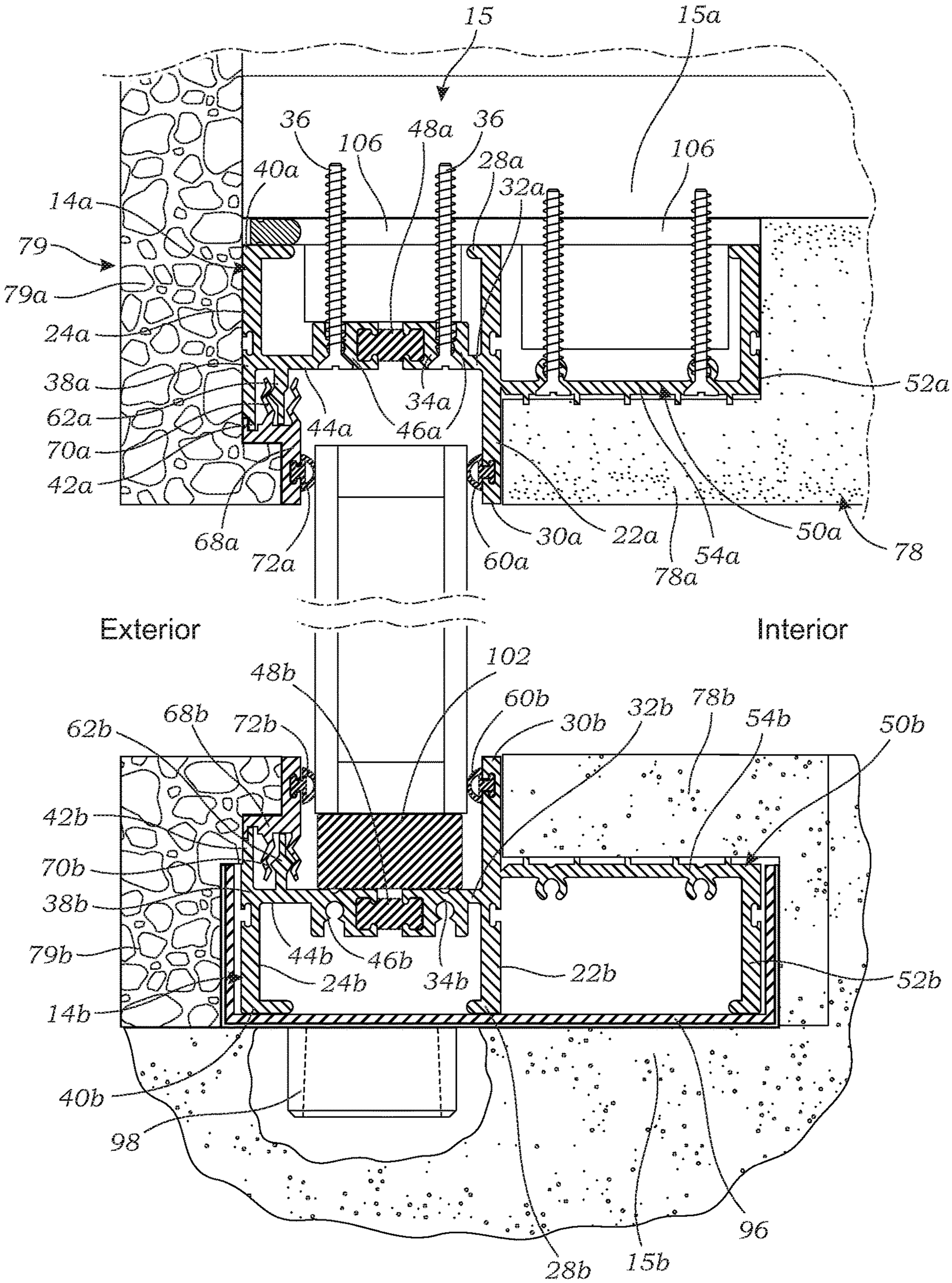
Fig. 5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52a
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22a
54a
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78a
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Fig. 6

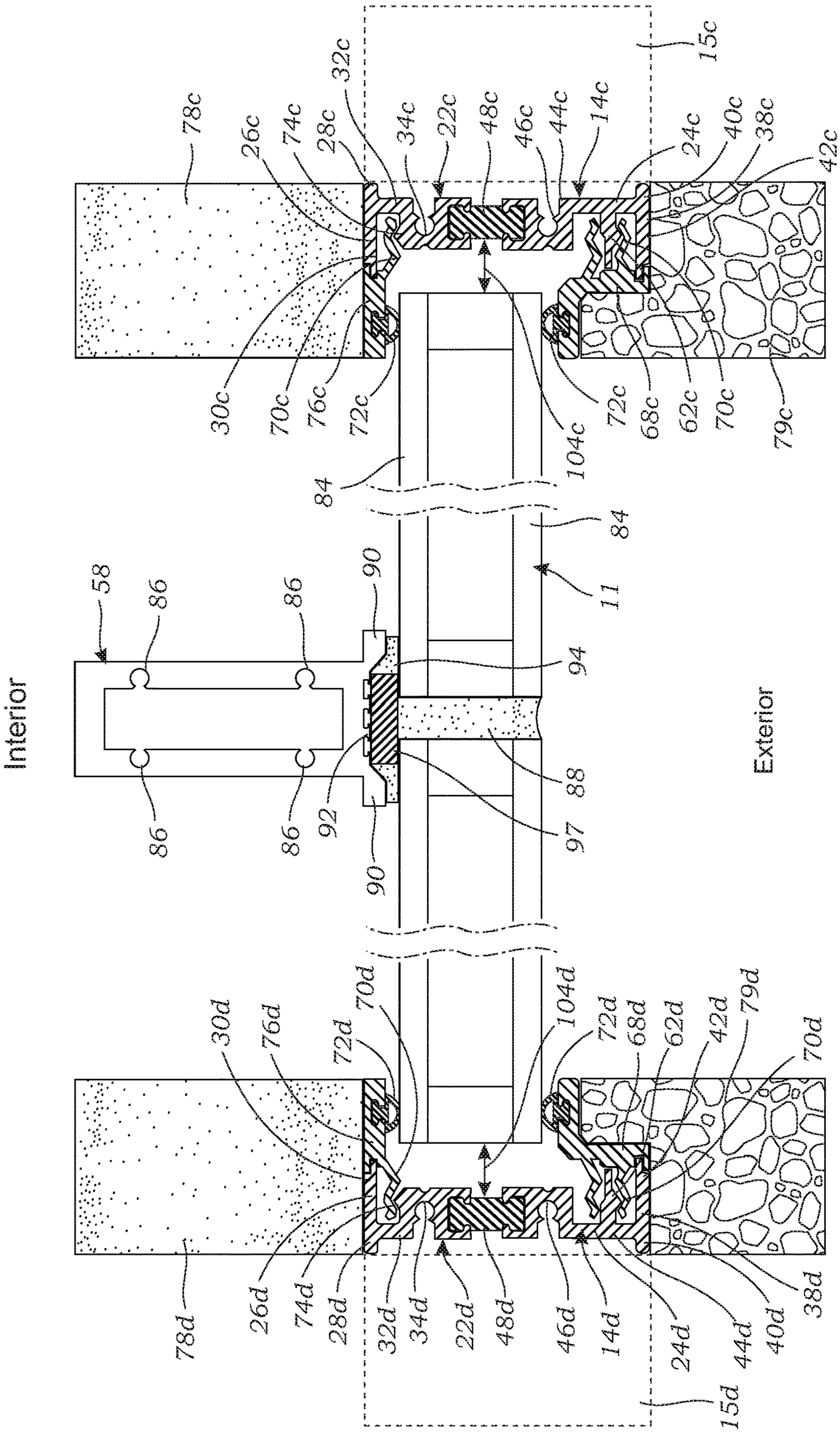
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Fig. 7

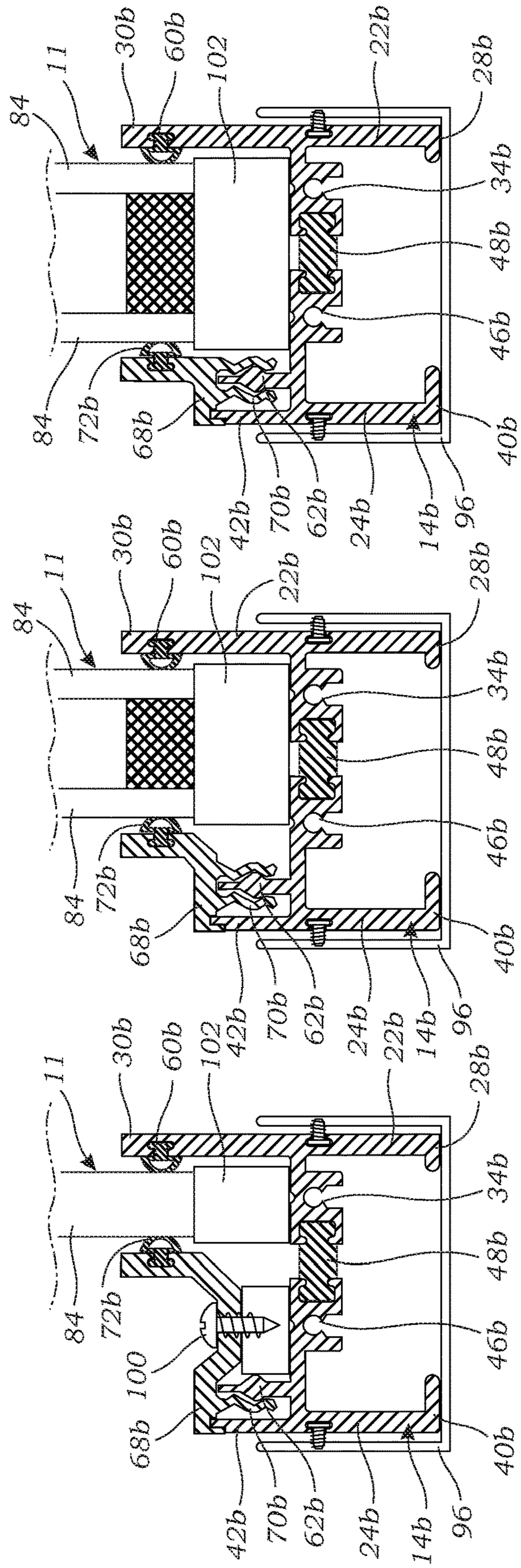

Fig. 8C

Fig. 8B

Fig. 8A

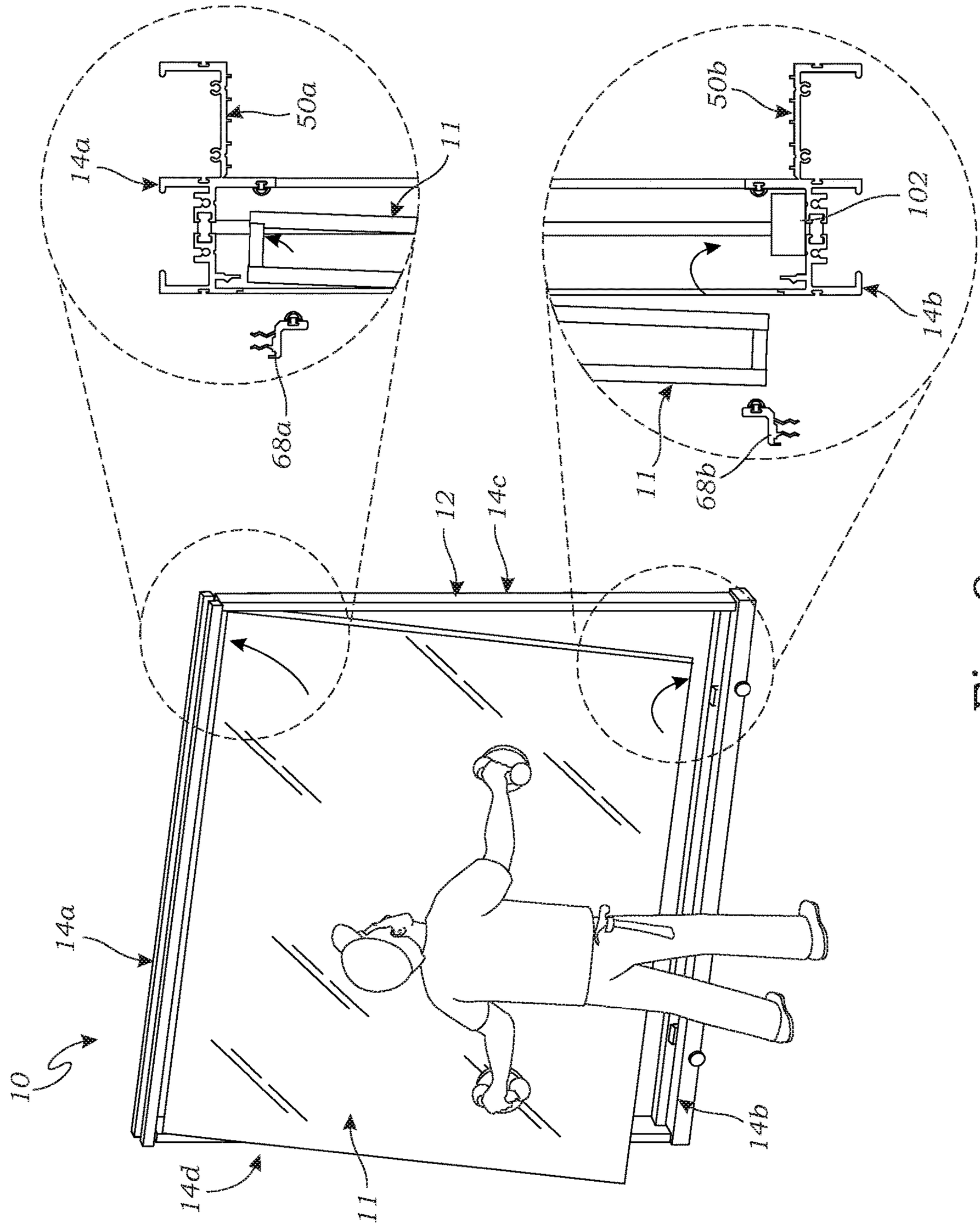

Fig. 9

WINDOW ASSEMBLY HAVING FRAMELESS APPEARANCE AND REMOVABLE GLASS PANEL

BACKGROUND

The field of the invention generally relates to windows on buildings, and more particularly, to a window assembly that provides a flush to finish, frameless appearance and allows the window panes to be removed with minimal removal of finish surround around the installed window.

Windows on buildings, such as residential homes, apartments buildings, and business offices, typically comprise a window frame installed in an opening in a wall of the building, and a pane of glass installed in the window frame. A number of window designs have been previously disclosed. In some prior designs, a frame is installed into a rough window opening frame of a wall of a building, and then the glass panes are installed in the frame and glass stops are installed to hold the glass in the frame. FIG. **1** illustrates one such prior window design. The window **200** has a frame **212** which is installed in the window framing **214** forming the window opening in a wall. The glass panel **216** is installed in the frame **212**, and then the glass stops **218** are inserted into the frame **212** to hold the glass panel **216** in place in the frame **212**. Then, the finish surround **220** (i.e., the finished walls, interior finish surround **220***a* and exterior finish surround **220***b*) is constructed around the installed frame **212**. The glass stops **218** remain exposed above the finish surround **220** so this design does not provide a frameless appearance.

FIG. **2** shows another prior design for a window **230** which, in this case, provides a frameless appearance. The window **230** includes a frame **232** and glass panel **234** installed in the frame **232**. The glass pane **234** are installed within the window frame **232** with spacers **236** all around the glass panel **234**, such that the glass panel **234** cannot be removed from the window frame **232** without disassembling the entire window frame **232**. To install the window **230**, the entire window **230** is positioned in a window framing **214** and then the window frame **232** is secured to the window framing **214** using fasteners, such as screws or nails. The finish surround **238** is then constructed around the installed window **230**. As shown in FIG. **2**, the window **230** has a frameless appearance (i.e., the window frame **232** does not extend beyond the edges of the finish surround **238** such that the window frame **232** is entirely inset into the finish surround **238**. However, the glass panel **234** cannot be removed except by removing the entire finish surround **238**, and disassembling the window frame **232**. Indeed, the window **230** is not designed to allow the glass panes **234** to be removed and replaced.

Furthermore, in both of the prior window designs in FIGS. **1** and **2**, the interior and exterior of the window framing cannot be finished until after the window **200** or **230** has been installed.

SUMMARY

The present invention is directed to an innovative window assembly including a window frame which receives a glass panel to form a window. The window assembly is configured for installing in a window framing (also referred to as a "window casing") of a wall of a building. The window may be a floor to ceiling window, side wall to side wall window or a smaller window that does not extend all the way to one or more of the floor, ceiling, and/or side walls. The window assembly is configured to have a frameless appearance when installed with the finish surround installed around the interior and/or exterior of the window. The term "frameless appearance" means the window frame of a window is at or below the surface of the finish surround walls around the entire window frame on the interior and exterior of the window frame. In other words, the window frame is inset such that it is at or below the surface of the finish surround. The innovative design of the window frame to be installed without the glass panel installed, and installing the finish surround around some or all of the window frame, and then installing the glass panel into the window frame. This avoids damaging the glass while installing the finish surround around the installed window frame. Moreover, the design of the window assembly also allows the glass panel to be removed with a minimum removal of the finish surround, such as without removing any of the finish surround, or only removing the finish surround around several sides of the only one of the interior or exterior of the window. For example, in most cases, only the interior finish surround around the right side and left side of the installed window frame needs to be removed to remove and replace the glass panel. Furthermore, the window assembly includes an integrated drain for draining moisture which leaks into the window assembly.

Accordingly, in one embodiment, a window assembly configured for installing in a window framing of a wall of a building comprises a window frame. The window frame is configured to mount in a window framing. The window frame includes a plurality of frame members including a head member, a sill member, a right side member, and a left side member. The frame members form a perimeter of the window frame. Each frame member has a respective full length from a first end of the frame member to a second end of the frame member.

Each of the frame members has an interior portion and an exterior portion. Each frame member extends substantially the full length of the respective frame member. The interior portion is configured to be positioned at an interior side of a glass panel when installed in the window frame. The exterior portion is configured to be positioned at an exterior side of the glass panel. Each of the interior portions is connected to a respective exterior portion. For example, the interior portion can be connected to the exterior portion using connectors, fasteners, adhesive, welding, etc., or they may even be integrally formed as a single part.

Each of the interior portions of the head member and sill member have a respective gasket for contacting and retaining the glass panel. The gasket may be an elastomer, polymer gasket which securely holds the glass panel, and also provides a seal between the interior portions and the surface of the glass panel.

Each of the exterior portions of the head member, sill member, right side member and left side member have a respective exterior retainer attachment. The exterior retainer attachments are configured to receive and retain a respective removable exterior retainer for holding the glass panel in the window frame. For example, the exterior retainer may be a male connector (e.g., a protrusion) which receives a mating female connector (e.g., a clip) of the exterior retainer, or vice versa.

The window assembly further includes respective exterior retainers that are removably attachable to the respective exterior retainer attachments. Each of the exterior retainers has a corresponding gasket for contacting and retaining the glass panel. When the exterior retainers are installed on the

corresponding exterior retainer attachments, the exterior retainers hold the exterior side of the glass panel in the window frame.

Similarly, each of the interior portions of the right side member and left side member have a respective interior retainer attachment. The interior retainer attachments are same or similar to the exterior retainer attachments. A pair of interior retainers are removably attachable to the respective interior retainer attachments. Each interior retainer has a corresponding gasket for contacting and retaining the glass panel. When the interior retainers are installed on the corresponding interior retainer attachments, the interior retainers hold the interior side of the glass panel in the window frame.

The window frame assembly is configured such that when the window frame is installed in the window framing and finish surround is installed around the installed window frame assembly, the window frame assembly has a frameless appearance. In addition, the window frame is configured such that when the glass panel is installed into the window frame, there is an edge space between a top edge of the glass panel and the head member allowing the glass panel to be moved planarly upward to remove the glass panel from the window assembly without removing finish surround installed around the head member and sill member.

In another aspect of the window assembly, each exterior retainer and corresponding gasket extends substantially the full length of the respective frame member to which it is removably attachable. Similarly, each interior retainer and corresponding gasket extends substantially the length of the respective frame member to which it is removably attachable.

In still another aspect of the window assembly, each of the interior portions includes an interior wall having an inside edge and an outside edge and a first fastening wall extending laterally from the interior wall. The first fastening wall has one or more bosses for receiving fasteners for mounting the respective frame member to the window framing. Furthermore, each of the exterior portions includes an exterior wall having an inside edge and an outside edge and a second fastening wall extending laterally from the interior wall, the second fastening wall having one or more bosses for receiving fasteners for mounting the respective frame member to the window framing. Also, each respective interior portion is connected to a respective exterior portion by connecting the respective first fastening wall of the interior portion to the respective second fastening wall of the exterior portion. In another aspect, the first fastening walls may be attached to the respective second fastening wall with a respective thermal break connector which thermally insulates the interior portion from the exterior portion.

In another aspect of the window assembly, the respective interior portion of the head member and sill member further comprise a respective shelf portion. Each shelf portion includes a shelf wall extending interiorly from the interior wall of the first interior portion within the outside edge of the interior wall and a leg portion extending from an interior end of the shelf outward. Each shelf has one or more bosses for receiving a fastener for mounting the respective frame member to the window framing.

In another aspect, the window assembly also includes a fin member having a top end and a bottom end and extending a full height of the window frame. The fin member is configured to be attached to the glass panel to provide structural support, especially for multi-pane glass panels. For example, for a glass panel with a width of two glass panes attached edge to edge, the fin member may be positioned at the edge to edge connection of the two glass panes. The top end and bottom end of the fin member each have a plurality of bosses for receiving fasteners for mounting the fin member to the respective shelf portions of the interior portions of the head member and the sill member.

In still another aspect, the fin member may comprise a rectangular box beam and a pair of mounting feet extending from a first side of the rectangular box beam. The first side and mounting feet are configured to be attached to the glass panel, for example using structural adhesive and/or fasteners.

In still another aspect, the window assembly further includes a sill pan configured to receive the sill member and to collect water draining from the window assembly. One or more drains are coupled to a bottom of the sill pan and are in fluid communication with an interior of the sill pan for draining water from the sill pan.

In another aspect, the window assembly also includes a glass panel configured for being installed in the window frame with each of the retainers attached to the respective retainer attachment, such that each of the gaskets contacts and holds the glass panel in place in the window frame.

In yet another aspect, the glass panel comprises a plurality of end-long spaced glass panes attached together edge to edge. In such case, the window assembly may further comprise the fin member, described herein.

In still another aspect, the window assembly is configured such that the exterior retainers are selected from a selection of different exterior retainers, wherein each different exterior retainer configured to accommodate a different thickness of glass panel in the window frame. The exterior retainer attachments are configured to receive each of the different exterior retainers without any adjustment or alteration. Likewise, each of the different exterior retainers are configured to attach to the exterior retainer attachments without adjusting or altering the other components of the window assembly. In this way, the window assembly can accommodate glass panels of different thicknesses simply by using different exterior retainers, while all of the other components remain the same.

In another aspect, the window frame is configured to allow the glass panel to be removed without removing the window frame or the finish surround around the window frame. The window frame is configured such that when the glass panel is installed into the window frame, there is a respective edge space between respective edges of the glass panel and the right side member, and left side member allowing the glass panel to be moved planarly (i.e., in the plane of the glass panel) in the window frame. The interior retainers of the right side member and left side member are configured to be removed from the respective right side member and left side member after the window assembly is installed in the wall framing and finish surround is installed around an interior of the right side member and left side member without removing the finished surround along the right side member and left side member. A glass panel comprising a plurality of end-long spaced glass panes attached together edge to edge installed in a window frame with finish surround installed around the interior of the right side member and left side member is removable from the window frame interiorly without removing the finish surround installed around the interior of the right side member and left side member.

In another aspect, the window assembly is configured such that a glass panel installed in the window assembly installed in the window framing with finish surround installed around the entire installed window assembly is

removable from the installed window assembly without removing any of the finish surround and without breaking the glass panel.

Another embodiment of the present invention is directed to a method of installing the window assembly disclosed herein into a window framing of a wall of a building. In one embodiment, the method includes installing each of the frame members of the window frame in a window framing of a building. A glass panel is positioned into the window frame. The exterior retainers and interior retainers are attached to their corresponding exterior retainer attachments and interior retainer attachments, respectively. The glass panel can be positioned into the installed window frame from the exterior or the interior side of the window.

In another aspect, the method further comprises installing finish surround around an entire interior and exterior of the installed window assembly. The finish surround is the finished walls and/or facade around the window, which gives a finished appearance to the walls around the window. For example, the finish surround may match the finished walls on the exterior or interior of the wall in which the window is installed. In one aspect of the method, the finish surround may be installed around the entire interior and exterior of the installed window assembly prior to positioning the glass panel into the window frame. In another aspect, the finish surround may be installed after positioning the glass panel into the window frame.

In another aspect, the glass panel may comprise a plurality of end-long spaced glass panes. For instance, large windows may utilized a glass panel having multiple glass panes which attach edge to edge to form a large window. Note that each glass pane may also have multiple overlaid panes of glass, such as dual-pane, triple-pane, glass panels. Each end-long glass pane is installed into the window frame separately, and then the glass panes are attached together edge to edge using a structural adhesive.

In another aspect of the method, a fin member is installed on the window. The fin member has a top end and a bottom end and extending a full height of the window frame. The fin member is installed by attaching the fin member to the glass panel at the attached edge of the glass panes, and the top end and bottom end of the fin member are attached to the respective interior portions of the head member and the sill member.

In yet another aspect, the glass panel is positioned into the window frame from the exterior, and while positioning the glass panel into the window frame, at least one of the interior retainers is attached to the corresponding interior retainer attachments and one or more of the exterior retainers are unattached to corresponding exterior retainer attachments. In still another aspect, the finish surround is installed around an entire interior of the installed window frame prior to positioning the glass panel into the window frame from the exterior side of the wall (i.e., the outside of the wall).

In still another aspect, the glass panel is positioned into the window frame from the interior, and at least one of the exterior retainers is attached to the corresponding exterior retainer attachments and one or more of the interior retainers are unattached to corresponding interior retainer attachments prior to positioning the glass panel into the window frame from the interior. In another aspect, the finish surround is installed around an entire exterior of the installed window frame prior to positioning the glass panel into the window frame from the interior side of the wall (i.e., the inside of the wall).

Another embodiment of the present invention is directed to removing a glass panel from the window assembly disclosed herein, wherein the window assembly and glass panel are installed in a window framing with finish surround installed around an entire interior and exterior of the installed window assembly. In one embodiment, the method includes removing the respective interior retainers from the respective interior retainer attachments of the right side member and left side member. Then, the glass panel is moved upward into the edge space in the head member. In this position, the glass panel is pivoted to move a bottom edge of the glass panel interiorly out from the sill member. The glass panel is then moved downward to remove the top edge of the glass panel out from the head member. This removes the entire glass panel from the window frame.

In another aspect of the method, the glass panel is removed without removing any of the finish surround from around the interior of the right side member and left side member.

In yet another aspect, prior to pivoting the glass panel, at least some of the finish surround is removed from around the interior of the right side member and left side member.

Another embodiment of the present invention is directed to removing a glass panel comprising multiple glass panes attached edge to edge using structural adhesive from a window assembly described herein, wherein the window assembly is installed in a window framing with finish surround installed around an entire interior and exterior of the installed window assembly. The glass panel comprises a plurality of glass panes, including at least a first glass pane and second glass pane forming the outer sides of the glass panel. The method includes detaching the first glass pane and second glass pane from the glass panel by removing the structural adhesive. The first glass pane is removed from the window assembly by first moving the first glass pane planarly out of the left side member (i.e., sliding it to the right). The first glass pane is moved upward into the edge space in the head member and then pivoted to move a bottom edge of the first glass pane interiorly out from the sill member. The first glass pane is moved downward to remove the top edge of the first glass pane out from the head member. The second glass pane is removed from the window assembly similarly, except that it is moved planarly out of the right side member (i.e., sliding it to the left).

In another aspect of the method of removing the multi-paned glass panel, the glass panel is removed without removing any of the finish surround from around the interior of the right side member and left side member.

In yet another aspect, one or more additional interior panes of plurality of glass panes may be removed by moving the interior glass pane upward into the edge space in the head member and pivoting the interior glass pane to move a bottom edge of the interior glass pane interiorly out from the sill member. Then, the interior glass pane is moved downward to remove the top edge of the interior glass pane out from the head member.

In additional aspects of the various methods of removing a glass panel from the window assembly, any one or more of the exterior retainers and/or interior retainers may be removed prior to removing the glass panel or glass panes of the glass panel. Removing one or more retainers may facilitate moving the glass panel/panes within the frame members, and also pivoting and removing the glass panel/panes.

As used herein, the term "flush" means that a respective surface of each of the referenced structures are even with each other such that no part protrudes out more than the other.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other aspects of embodiments are described in further detail with reference to the accompanying drawings, wherein like reference numerals refer to like elements and the description for like elements shall be applicable for all described embodiments wherever relevant:

FIG. **1** is a cross-sectional view of a window assembly in the prior art;

FIG. **2** is a side, cut-away view of another window assembly in the prior art;

FIG. **3** is a side, schematic view of a window assembly, according to one embodiment of the present invention;

FIG. **4** is a front, perspective, exploded view of the window assembly of FIG. **3**, according to one embodiment of the present invention;

FIG. **5** is a cross-sectional view of the window assembly of FIG. **3** along line **5-5**, according to one embodiment of the present invention;

FIG. **6** is another cross-sectional view of the window assembly of FIG. **3** along line **5-5**, showing the window frame mounting fasteners and window framing to which the window frame is attached, according to one embodiment of the present invention;

FIG. **7** is a cross-sectional view of the window assembly of FIG. **3** along line **7-7**, according to one embodiment of the present invention;

FIGS. **8**A-**8**C show cross-sectional views of the sill frame member of the window assembly of FIG. **3** with three different exterior retainers for supporting different thicknesses of glass panels in the window frame, according to one embodiment of the present invention;

FIG. **9** is a schematic illustrating a method for installing and/or removing a glass panel from a window assembly, according to one embodiment of the present invention.

DETAILED DESCRIPTION

Referring to FIGS. **3-9**, one embodiment of a window assembly **10** according to the present invention is illustrated. The window assembly **10** is configured to be installed in a window framing **15** forming a window opening in a wall of a building, such as a residential home, apartment building, or business office. As shown in FIGS. **6** and **7**, the window framing **15** includes a head **15***a,* a sill **15***b,* a right jamb **15***c* and a left jamb **15***d.* The window assembly **10** includes a window frame **12** having a plurality of frame members **14**, including a head member **14***a,* a sill member **14***b,* a right side member **14***c,* and a left side member **14***d.* As shown in FIGS. **3** and **4**, the frame members **14** form a closed perimeter of the window frame **12**. Each frame member **14** has a first end **16** and a second end **18**, and a respective full length extending from the first end **16** to the second end **18**. Thus, the head member **14***a* has a first end **16***a* and a second end **18***a,* the sill member **14***b* has a first end **16***b* and a second end **18***b,* the right side member has a first end **16***c* and a second end **18***c,* and the left side member has a first end **16***d* and a second end **18***d.*

As shown in FIG. **4**, the frame members **14** can be attached to each other using fasteners **20** to attach a first end **16** or second end **18** of one frame member **14** to first end **16** or second end **18** of the adjoining frame member **14**.

Turning to FIGS. **5-7**, each of the frame members **14** has an interior portion **22** and an exterior portion **24**, such that the head member **14***a* has an interior portion **22***a* and an exterior portion **24***a,* the sill member **14***b* has an interior portion **22***b* and an exterior portion **24***b,* the right side member **14***c* has an interior portion **22***c* and an exterior portion **24***c,* and the left side member **14***d* has an interior portion **22***d* and an exterior portion **24***d.* The terms "interior" and "interiorly" refer to elements or relative positioning of elements which are towards the interior of the window (i.e., the inside of the window) relative to another element, while the terms "exterior" and "exteriorly" refer to elements or relative positioning of elements which are towards the exterior of the window (i.e., the outside of the window) relative to another element. The interior portions **22** are configured to be positioned on the interior side of the glass panel **11** when the window assembly **10** is installed, and the exterior portions **24** are configured to be positioned on the exterior side of the glass panel **11**.

Each of the interior portions **22** includes an interior wall **26** having an outer edge **28** and an inner edge **30**, and a fastening wall **32** extending laterally inward from the interior wall **26**. The fastening wall **32** has one or more apertures **34** and/or bosses **34** for receiving fasteners **36** for mounting the respective frame member **14** to the window framing. The terms "outer," "outward", "outwardly" and the like, are relative to the perimeter and middle of the window assembly in an elevational view of the window assembly, such that these terms refer r to elements or relative positioning of elements which are towards the perimeter of the window relative to another element. The terms "inner," "inward", and "inwardly", are relative to the perimeter and middle of the window assembly in an elevational view of the window assembly, such that these terms refer to elements or relative positioning of elements which are toward the middle of the window relative to another element. For example, the outer edge **28** of each fastening wall **28** is toward the perimeter of the window assembly **10** relative to the inner edge **30**.

Each of the interior portions **22***a,* **22***b* of the head member **14***a* and sill member **14***b* have a respective gasket **60***a,* **60***b* attached to exterior side of the respective interior walls **26***a,* **26***b* for contacting and retaining the glass panel **11** in head member **14***a* and sill member **14***b*. The gaskets **60***a,* **60***b* are an elastomer, polymer gasket which securely holds the glass panel **11**, and seals between the interior walls **26***a,* **26***b* and the interior surface of the glass panel **11**.

Each of the exterior portions **24** includes an exterior wall **38** having an outer edge **40** and an inner edge **42**, and a fastening wall **44** extending laterally inward from the interior wall **26**. The fastening wall **44** has one or more apertures **46** and/or bosses **46** for receiving fasteners **36** for mounting the respective frame member **14** to the window framing. The terms "outer," "outward", "outwardly" and the like, are relative to the perimeter and middle of the window assembly in an elevational view of the window assembly, such that these terms refer r to elements or relative positioning of elements which are towards the perimeter of the window relative to another element.

Each respective interior portion **22** is connected to the respective exterior portion **24** by connecting the respective fastening wall **32** of the interior portion **22** to a respective fastening wall **44** of the exterior portion **24**. Each respective fastening wall **32** of the interior portion **22** is connected to the respective fastening wall **44** of the exterior portion **24** using a respective thermal break connector **48**. The thermal break connectors **48** thermally insulate the corresponding interior portion **22** from the corresponding exterior portion **24**. For instance, for the head member **14***a,* the interior portion **22***a* is connected to the exterior portion **24***a* by fastening the fastening wall **32***a* to the fastening wall **44***a* using the thermal break connector **48***a.*

The description is the same for each of the other frame members **14**. The thermal break connectors **44** may be formed of a polymer material such as polyurethane (0.02 W/(m K)) or other suitable plastic material (about 0.02-0.50 W/(m K), which has a much lower thermal conductivity than metals like aluminum and steel. Alternatively, the interior portions **22** may be connected to respective exterior portions **24** using connectors, fasteners, adhesive, welding, etc., or they may be formed as an integral part.

The respective interior portion **22** of each of the head member **14***a* and sill member **14***b* have a respective shelf portion **50***a,* **50***b.* The shelf portion **50** is disposed on the interior side for the interior wall **26**. Each shelf portion **50** includes a shelf wall **52** connecting to, and extending interiorly from, the interior wall of the interior portion and a support wall **54** extending outward from an interior end of the shelf wall **52**. The shelf wall **52** has one more bosses **56** for receiving a fastener for mounting the respective frame member **14***a,* **14***b* to the window framing. The shelf wall **52** also has one or more bosses or apertures for receiving fasteners for attaching the fin member **58** to the shelf portions **50***a,* **50***b.*

Each of the exterior portions **24** of the frame members **14** have a respective exterior retainer attachment **62**. The exterior retainer attachments **62** are configured to receive and retain a respective removable exterior retainer **68** for holding the glass panel **11** in the window frame **12**. In the illustrated embodiment, the exterior retainer attachments **62** comprise a male connector **62** (e.g., a protrusion) extending inwardly from the respective fastening wall **44**. The male connectors **62** include a diamond shaped bulb which receives a mating female connector **70** (e.g., a clip **70**) of the exterior retainer **68**, or vice versa.

The window assembly **10** also has respective exterior retainers **68** that are removably attachable to the respective exterior retainer attachments **62**. The exterior retainers **68** comprise a clip **70** which removably attaches to the male connector **62** of the exterior retainer attachment **62**. Each of the exterior retainers **68** has a corresponding gasket **72** for contacting and retaining the glass panel **11**. When the exterior retainers **68** are installed on the corresponding exterior retainer attachments **62**, the exterior retainers **68** hold the exterior side of the glass panel **11** in the window frame **12**. The gaskets **72***a,* **72***b* are an elastomer, polymer gasket which securely holds the glass panel **11**, and provides a seal between the head member **14***a* and sill member **14***b* and the exterior surface of the glass panel **11**.

Turning to FIG. **8**, the window frame **12** is configured such that it can accommodate different thicknesses of glass panels **11** in the window frame assembly **10**. FIGS. **8**A-**8**C illustrate the sill member **14***b* having different exterior retainers **68***b* for accommodating different thicknesses of glass panels **11**. The exterior retainers **68***a,* **68***c* and **68***d* would be modified in the same way as the exterior retainer **68***b* to accommodate the different thicknesses of glass panels **11** shown in FIGS. **8**A-**8**C. For instance, FIG. **8**A shows a portion of a window assembly **10** having a relatively thin glass panel **11**A. The glass panel **11**A comprises a single glass pane **84** in thickness (e.g., the thickness of the single glass pane **84** may be about 9/16 inch). To accommodate the thin glass panel **11**A, the exterior retainer **68***b* (as well as the other exterior retainers **68***a,* **68***c,* and **68***d*) is wider in dimension from its connection with the exterior wall **24***b* to the gasket **72***b* where the exterior retainer **84** contacts the exterior surface of the glass panel **11**A. Support screws **100** are also used to attach the exterior retainers **68** to reinforce the connection of the exterior retainers **68** to the exterior retainer attachments **62**.

FIG. **8**B shows a portion of a window assembly **10** having a thicker glass panel **11**B than the thin glass panel **11**A of FIG. **8**A. The glass panel **11**B is dual glass pane **84** in thickness, with a space between each pane **84** (e.g., the thickness of the dual glass pane **84** may be about 1-⅜ inches). To accommodate the thicker glass panel **11**B, the exterior retainer **68***b* (as well as the other exterior retainers **68***a,* **68***c,* and **68***d*) is narrower in dimension than in FIG. **8**A from its connection with the exterior wall **24***b* to the gasket **72***b* where the exterior retainer **84** contacts the exterior surface of the glass panel **11**B.

FIG. **8**C shows a portion of a window assembly **10** having an even thicker glass panel **11**C than the glass panel **11**B of FIG. **8**B. The glass panel **11**C is also a dual glass pane **84** in thickness, with a wider space between each pane **84** than the glass panel of **11**B (e.g., the thickness of the dual glass pane **84** may be about 1.5 inches). To accommodate the thicker glass panel **11**C, the exterior retainer **68***b* (as well as the other exterior retainers **68***a,* **68***c,* and **68***d*) is even narrower in dimension than in FIG. **8**B from its connection with the exterior wall **24***b* to the gasket **72***b* where the exterior retainer **84** contacts the exterior surface of the glass panel **11**C.

Thus, the window assembly **10** is configured such that the exterior retainers **68** are selected from a selection of different exterior retainers **68**, wherein each different exterior retainer **68** is configured to accommodate a different thickness of glass panel **11** in the window frame **12**. The exterior retainer attachments **62** are configured to receive each of the different exterior retainers **68** without any adjustment or alteration. Moreover, each of the different exterior retainers **68** are configured to attach to the exterior retainer attachments **62** without adjusting or altering the other components of the window assembly **10**. In this way, the window assembly **10** can be configured to accommodate glass panels **11** of different thicknesses by selecting and using the appropriate exterior retainers **68**, while all of the other components of the window assembly **10** remain the same.

Similarly, each of the interior portions **22***c,* **22***d* of the right side member **14***c* and left side member **14***d* have respective interior retainer attachment **74***c,* **74***d.* The interior retainer attachments **74** are configured to receive and retain a respective removable interior retainer **76** for holding the glass panel **11** in the window frame **12**. The interior retainer attachments **74** have a male connector (e.g., a male bulb, as shown) extending inwardly from the respective fastening wall **32**. The male connector is configured to receive a mating connector female connector **70** (e.g., a clip **70**) of the interior retainer **76**, or vice versa. Respective interior retainers **76** are removably attachable to the respective interior retainer attachments **74**. The interior retainers **76** comprise a clip **70** which removably attaches to the male connector of the interior retainer attachment **74**. Each of the interior retainers **76** has a corresponding gasket **72** for contacting and retaining the glass panel **11**. When the interior retainers **76** are installed on the corresponding interior retainer attachments **74**, the interior retainers **76** hold the interior side of the glass panel **11** in the window frame **12**. The gaskets **72***c,* **72***d* are an elastomer, polymer gasket which securely holds the glass panel **11**, and seals between the interior retainers **76** and interior walls **22** and the interior surface of the glass panel **11**. As shown in FIG. **7**, the interior retainers **76** and interior retainer attachments **74** are configured such that the interior retainers **76** can be removed and/or installed with the

window frame assembly **10** fully installed and the interior finish surround **78***c,* **78***d,* fully installed around the interior of the right side member **14***c* and the left side member **14***d* without removing such finish surround.

Each of the exterior retainers **68**, interior retainers **76**, and corresponding gaskets **72** extends substantially the full length of the respective frame member **14** to which it is removably attachable.

The window assembly **10** may also include a fin member **58** having a top end **80** and a bottom end **82** and extending a full height of the window frame **12**. The fin member **58** is optional, and may not be used in some cases, such as for smaller glass panels **11** having only a single glass pane **84**. In some cases, the glass panel **11** may comprise a plurality of side-to-side spaced glass panes **84** (also referred to as "end-long glass panes"). For instance, large windows may utilize a glass panel **11** having multiple glass panes **84** which attach edge to edge to form a large window. In addition, each glass pane **84** may also have multiple overlaid panes of glass, such as dual-pane, triple-pane, glass panels. The end-long glass panes **84** are attached together edge to edge using a structural adhesive **88** (see FIG. **7**).

The fin member **58** is configured to be attached to the glass panel **11** to provide structural support, especially for glass panels **11** having two or more end-long glass panes **84**. The embodiment illustrated in FIGS. **3-9** has a glass panel **11** having two end-long glass panes **84** attached edge to edge, as illustrated in the FIG. **3**. For a glass panel **11** comprising two or more end-long glass panes **84** attached together edge to edge, a respective fin member **58** may be positioned at each of the edge to edge connections of the glass panes **84**. The top end **80** and bottom end **82** of the fin member **58** each have a plurality of bosses **86** for receiving fasteners for mounting the fin member **58** to the respective shelf portions **50** of the interior portions **22** of the head member **14***a* and the sill member **14***b*. The fin member **58** may be in the form of a rectangular box beam, or other suitable shape. The fin member **58** may also have a pair of mounting feet **90** extending from a first side **92** of the rectangular box beam. The first side **92** and mounting feet **90** are configured to be attached to the glass panel **11** along the interface of adjacent end-long glass panes **84** using structural adhesive **94** and/or fasteners. A fin spacer **97** may be disposed between the fin member **58** and the glass panes **84**. The fin spacer **97** provides a consistent space for the structural adhesive **94** to attach the fin member **58** to the glass panes **84**.

The window assembly **10** also has a sill pan **96** (or Arche-Duct **96**) which receives and surrounds the sill member **14***b* (including the shelf portion **52***b*) to collect water draining from the window assembly **10**. One or more drains **98** are coupled to a bottom of the sill pan and are in fluid communication with an interior of the sill pan **96** for draining water from the sill pan **96**.

The window assembly **10** includes a setting block **102** which is placed on the sill member **14***b* upon which the glass panel **11** rests when installed in the window frame **12**. As shown in FIGS. **5-7**, the assembled window frame **12** maintains an edge space **104** between the outer edge of the glass panel **11** and the respective head member **14***a,* right side member **14***c* and left side member **14***d* which allows the glass panel **11** to be moved planarly (i.e., in a direction in the plane of the glass panel **11**) upward into the head member **14***a,* right side member **14***c* and/or left side member **14***d*. This planar movement allows the glass panel **11** to be installed and/or removed from the installed window assembly **10** without removing the finish surround around one or more of the frame members **14**, as described herein.

FIGS. **5** and **6** illustrate the window assembly **10** is installed in the window framing **15** with finish surround installed around the entire interior and exterior of the window assembly **10**. The finish surround includes interior finish surround **78**, which includes interior finish surround **78***a* around the interior of the head member **14***a,* interior finish surround **78***b* around the interior of the head member **14***b,* interior finish surround **78***c* around the interior of the right side member **14***c,* and interior finish surround **78***d* around the interior of the left side member **14***d*. The exterior finish surround **79** includes exterior finish surround **79***a* around the exterior of the head member **14***a,* exterior finish surround **79***b* around the exterior of head member **14***b,* exterior finish surround **79***c* around the exterior of the right side member **14***c,* and exterior finish surround **79***d* around the exterior of the left side member **14***d.* Accordingly, the window assembly **10** has a frameless appearance when installed with the finish surround **78**, **79** installed around the interior and/or exterior of the window.

Various methods of installing the window assembly **10** into the window framing **15** will now be described. In one embodiment, the window assembly **10** is installed without any of the finish surround **78**, **79** installed at the commencement of the installation. The method includes first installing the sill pan **96** into the sill **15***b* of the window framing **15**. One or more shims or leveling filler may be used to level the sill pan **96**. One or more drains **98** (e.g., drain pipes) are connected to the sill pan **96**.

The frame members **14***a,* **14***b,* **14***c,* **14***d* are assembled with screws (see FIG. **4**) to form the window frame **12**. Preferably, the frame members **14** are assembled without the interior retainers **76***c,* **76***d,* and exterior retainers **68***a,* **68***b,* **68***c,* **68***d* installed on the frame members **14**, but the window frame **12** can be assembled with the retainers **68**, **76** installed, but then at least some need to be removed before installing the glass panel **11**. If one or more fin members **58** are being utilized, the fin member(s) **58** are also installed in the window frame **12** using screws to attach the respective top end **80** to the shelf portion **50***a* of the head member **14***a* and the respective bottom end **82** to the shelf portion **50***b* of the sill member **14***b*. A compatible sealant may be applied to the corners of the frame at the interface of the adjoining frame members **14**.

The assembled window frame **12** is installed in the window framing **15** with the sill member **14***b* received in the sill pan **96**. Each of the respective frame members **14***a,* **14***b,* **14***c*, **14***d* are fastened to the corresponding head **15***a,* sill **15***b,* right jamb **15***c* and left jamb **15***d* using screws **36** inserted through the bosses or apertures **46** of each frame member **14** and driven into the corresponding part of the window framing **15**. One or more shims **106** may be used between the frame members **14** and the respective head **15***a,* right jamb **15***c,* and left jamb **15***d* (see FIG. **6**) to plumb, square, level and/or size adjust the window frame **12** to the window framing **15**. All of the screw heads **36** and any other holes are sealed with a compatible sealant. A bead of compatible sealant is also applied to the entire exterior and interior joint between the window frame **12** and the window framing **15**. The sealant is tooled to eliminate bubbles, void and/or breaks and to ensure a completely watertight seal.

The appropriate size exterior retainers **68** may be selected from a selection of different exterior retainers **68** configured for accommodating different thicknesses of glass panels **11**. The exterior retainers **68** and interior retainers **76** may be field cut to size after the window frame **12** is assembled

and/or installed in the window framing **15**. Each exterior retainer **68** and interior retainer **76** is field cut to fit the corresponding frame member **14**, and may be test fit to ensure proper fit. The exterior retainers **68** and interior retainers **76** are then removed prior to installing the glass panel **11**.

Turning to FIG. **9**, the glass panel **11** is then installed into the window frame **12**. First, setting blocks **102** are installed in the sill member **14***b* at each quarter length of the sill member **14***b* or as needed. With the glass panel **11** on the exterior of the window frame **12**, the top edge of the glass panel **11** is then inserted into the head member **14***a* with the glass panel **11** angled such that the bottom edge of the glass panel is exterior to the sill member **14***b*. The glass panel **11** is pushed upward such that the top edge inserts in to the edge space **104***a* of the head member **14***a*, and the bottom edge is swung inward until vertical with the bottom edge over the setting blocks **102** in the sill member **14***b*. Then, the glass panel **11** is lowered such that the bottom edge inserts into the sill member **14***b* and rests on the setting blocks **102**. Then, the glass panel **11** is centered horizontally. With the glass panel **11** in place in the window frame **12**, the exterior retainers **68***a*, **68***b*, **68***c*, **68***d* and the interior retainers **76***c*, **76***d* are installed on their corresponding exterior retainer attachments **62***a*, **62***b*, **62***c*, **62***d* and interior retainer attachments **74***c*, **74***d*.

If a fin member **58** is utilized in the window assembly **10**, then the method also includes the following. The fin spacer **97** may have two opposing sides having pre-applied adhesive. A first adhesive side attaches the fin spacer **97** to the fin member **58**. The fin spacer **97** may be pre-attached to the fin member **58**, or it may be attached to the fin member **58** during installation of the window assembly **10**. The fin spacer **97** is attached to the fin member **58** prior to the glass panel **11** being positioned in the installed window frame **12**. The second adhesive side has a protective film over the adhesive. After the glass panel **11** is positioned in the installed window frame **12**, the protective film is removed such that the second adhesive side attaches to the interior surface of the glass panel **11**. Structural sealant **94** is then applied between the glass panel **11** and the fin member **58**.

Then, the finish surround, including the interior finish surround **78** and exterior finish surround **79** is installed around the entire interior and exterior of the installed window assembly **10**, such that the finish surround **78**, **79** is flush, or slightly above, the window frame **12**. Again, this provides an installed window assembly **10** having a frameless appearance.

Alternatively, the method of installing the window assembly **10** may have the glass panel **11** positioned into the installed window frame **12** from the interior side of the window in substantially the same manner.

In another alternative of the method, one or more of the interior retainers **76***a*, **76***b*, **76***c*, **76***d* may be installed on the respective interior retainer attachments **74***a*, **74***b*, **74***c*, **74***d*, and one or more of the exterior retainers **68** are unattached to corresponding exterior retainer attachments **62**, prior to positioning the glass panel **11** into the window frame **12**, and while positioning the glass panel **11** into the window frame **12**.

In another alternative of the method, the finish surround **78**, **79** is installed around the entire interior and exterior of the window framing **15** prior to positioning the glass panel **11** into the window frame **12** from the exterior side of the window frame **12**.

In another alternative of the method, the finish surround **78**, **79** is installed around then entire interior and exterior of the window framing **15** prior installing the window frame **12** into the window framing **15**.

In another alternative of the method, the glass panel **11** is positioned into the installed window frame **12** from the interior, and at least one of the exterior retainers **68** is attached to the corresponding exterior retainer attachments **62** and one or more of the interior retainers **76** are unattached to corresponding interior retainer attachments **72**, prior to positioning the glass panel **11** into the window frame **12** from the interior. In another alternative, the entire exterior finish surround **79** is installed around the entire exterior of the installed window frame **12** prior to positioning the glass panel **11** into the window frame from the interior side of the window frame **12**.

Various methods of removing the glass panel **11** from the installed window assembly **10**, with finish surround **78**, **79** installed around the entire interior and exterior of the installed window assembly, will now be described. The glass panel **11** may need to be removed from the installed window frame **12** for various reasons, such as a crack, scratch, or other damage to the glass panel **11**.

In one embodiment, the method includes removing the respective interior retainers **76***c*, **76***d* from the respective interior retainer attachments **74***c*, **74***d* of the right side member **14***c* and left side member **14***d*. Then, the glass panel **11** is moved upward into the edge space **104***a* in the head member **14***a*. In this position, the glass panel **11** is pivoted to move the bottom edge of the glass panel **11** interiorly out from the sill member **14***b*. The glass panel **11** is then moved downward to remove the top edge of the glass panel **11** out from the head member **14***a*. This removes the entire glass panel **11** to the interior of the installed window frame **12**. In most cases, at least prior to pivoting the glass panel **11**, at least some of the interior finish surround **78***c*, **78***d* is removed from around the interior of the right side member **14***c* and left side member **14***d*, to allow the glass panel **11** to be pivoted interiorly. Also, if the window assembly **10** includes a fin member **58**, the fin member **58** is removed by removing the fasteners attaching the fin member **58** to the shelf portions **52***a*, **52***b*, and removing the structural adhesive **94**.

In an alternative method, the glass panel **11** may be removed to the exterior of the window frame **12** by removing the respective exterior retainers **68***c*, **68***d* from the respective interior retainer attachments **62***c*, **62***d* of the right side member **14***c* and left side member **14***d*. Then, the glass panel **11** is removed similarly to method described above, except that the bottom edge of the glass panel **11** is pivoted exteriorly, and the glass panel **11** is removed to the exterior of the window frame **12**. Similar to the method above, at least prior to pivoting the glass panel **11**, at least some of the exterior finish surround **79***c*, **79***d* is removed from around the exterior of the right side member **14***c* and left side member **14***d*, to allow the exterior retainers **68***c*, **68***d* to be removed and to allow the glass panel **11** to be pivoted exteriorly.

Another method is directed to removing a glass panel **11** comprising multiple glass panes **84***a*, **84***b* attached edge to edge using structural adhesive from an installed window assembly **10** with finish surround **78**, **79** installed around an entire interior and exterior of the installed window assembly **10**. The method includes detaching the first glass pane **84***a* from the and second glass pane **84***b* removing the structural adhesive **94**. The first glass pane **84***a* is removed from the window assembly **10** by first moving the first glass pane **84***a* sideways out of the right side member **14***c* (i.e., sliding it to

the left, as viewed from the exterior, which moves the right edge of the first glass pane **84***a* out of the right side member **14***c*. The first glass pane **84***a* is moved upward into the edge space **104***a* in the head member **14***a* and then is pivoted to move the bottom edge of the first glass pane **84***a* interiorly out from the sill member **14***b*. The first glass pane **84***a* is moved downward to remove the top edge of the first glass pane **84***a* out from the head member **14***a*. The second glass pane **84***b* is removed from the window assembly **10** similarly, except that it is moved sideways out of the left side member **14***d* (i.e., sliding it to the right, as viewed from the exterior). In a very innovative aspect of this method of removing the multi-paned glass panel **11**, the entire glass panel **11** is removed without removing any of the finish surround **78**, **79**, including not removing any of the finish surround **78***c*, **78***d* from around the interior of the right side member **14***c* and left side member **14***d*.

If the glass panel **11** comprises one or more additional interior panes **84** attached edge to edge between the first glass pane **84***a* and second glass pane **84***b*, they may be removed by simply moving the interior glass pane **84** upward into the edge space **104***a* in the head member **14***a* and pivoting the interior glass pane **84** to move the bottom edge of the interior glass pane **84** interiorly out from the sill member **14***b*. Then, the interior glass pane **84** is moved downward to remove the top edge of the interior glass pane **84** out from the head member **14***a*.

In alternative methods of removing the glass panel **11** from the window assembly **10**, any one or more of the exterior retainers **68***a*, **68***b*, **68***c*, **68***d* and/or interior retainers **76***c*, **76***d* may be removed prior to removing the glass panel **11** or glass panes **84** of the glass panel **11**. Removing one or more retainers **68**, **76** may facilitate moving the glass panel **11** or glass panes **84** within the frame members **14**, and also pivoting and removing the glass panel **11** or glass panes **84**.

Although particular embodiments have been shown and described, it is to be understood that the above description is not intended to limit the scope of these embodiments. While embodiments and variations of the many aspects of the invention have been disclosed and described herein, such disclosure is provided for purposes of explanation and illustration only. Thus, various changes and modifications may be made without departing from the scope of the claims. For example, not all of the components described in the embodiments are necessary, and the invention may include any suitable combinations of the described components, and the general shapes and relative sizes of the components of the invention may be modified. The invention, therefore, should not be limited, except to the following claims, and their equivalents.

What is claimed is:

1. A method of installing a window assembly into a window framing of a wall of a building, the window assembly comprising:

a window frame which mounts in a window framing, the window frame having a plurality of frame members including a head member, a sill member, and a left side member, which form a perimeter of the frame, each of the frame members having a respective full length from a first end to a second end thereof;

each of the frame members having an interior portion and an exterior portion, each of the interior portions and each of the exterior portions extending substantially the full length of the respective frame member, each of the interior portions configured to be positioned at an interior side of a glass panel when installed in the window frame and each of the exterior portions configured to be positioned at an exterior side of the glass panel, each of the respective interior portions connected to a respective exterior portion;

each of the interior portions of the head member and sill member having a respective gasket disposed on the respective interior portion for contacting and retaining the glass panel,

each of the exterior portions of the head member, sill member, right side member and left side member having a respective exterior retainer attachment;

respective exterior retainers removably attachable to the respective exterior retainer attachments, each the exterior retainers having a gasket for contacting and retaining the glass panel,

each of the interior portions of the right side member and left side member having a respective interior retainer attachment;

respective interior retainers removably attachable to the respective interior retainer attachments, each of the interior retainers having a gasket for contacting and retaining the glass panel; and

wherein the window frame assembly is configured such that when the window frame is installed in the window framing and finish surround is installed around the installed window frame assembly, the window frame assembly has a frameless appearance, and the window frame is configured such that the glass panel is installed into the window frame, there is an edge space between a top edge of the glass panel and the head member allowing the glass panel to be moved planarly upward to remove the glass panel from the window assembly without removing finish surround installed around the head member and sill member,

the method comprising:

installing each of the frame members of the window frame in the window framing;

positioning the glass panel into the window frame;

attaching the exterior retainers and interior retainers to corresponding exterior retainer attachments and interior retainer attachments, respectively.

2. The method of claim **1**, further comprising:

installing the finish surround around an entire interior and exterior of the installed window assembly.

3. The method of claim **2**, wherein the finish surround is installed around the entire interior and exterior of the installed window frame prior to positioning the glass panel into the window frame.

4. The method of claim **3**, wherein the glass panel comprises a plurality of end-long spaced glass panes and each glass pane is installed into the window frame separately, and then the glass panes are attached together edge to edge using a structural adhesive.

5. The method of claim **4**, further comprising:

installing a fin member having a top end and a bottom end and extending a full height of the window frame by attaching the fin member to the glass panel at the attached edge of the glass panes, and attaching the top end and bottom end of the fin member to the respective interior portions of the head member and the sill member.

6. The method of claim **1**, wherein at least one of the interior retainers is attached to corresponding interior retainer attachments and one or more of the exterior retainers are unattached to corresponding exterior retainer attachments while positioning the glass panel into the window frame, and the glass panel is positioned into the window frame from the exterior.

7. The method of claim 6, wherein the finish surround is installed around an entire interior of the installed window frame prior to positioning the glass panel into the window frame.

8. The method of claim 1, wherein at least one of the exterior retainers is attached to corresponding exterior retainer attachments and one or more of the interior retainers are unattached to corresponding interior retainer attachments prior to positioning the glass panel into the window frame, and the glass panel is positioned into the window frame from the interior.

9. The method of claim 8, wherein the finish surround is installed around an entire exterior of the installed window frame prior to positioning the glass panel into the window frame.

10. A window assembly configured for installing in a window framing of a wall of a building, comprising:

a window frame which mounts in a window framing, the window frame having a plurality of frame members including a head member, a sill member, a right side member, and a left side member, which form a perimeter of the frame, each of the frame members having a respective full length from a first end to a second end thereof;

each of the frame members having an interior portion and an exterior portion, each of the interior portions and each of the exterior portions extending substantially the full length of the respective frame member, each of the interior portions configured to be positioned at an interior side of a glass panel when installed in the window frame and each of the exterior portions configured to be positioned at an exterior side of the glass panel, each of the respective interior portions connected to a respective exterior portion;

each of the interior portions of the head member and sill member having a respective gasket disposed on the respective interior portion for contacting and retaining the glass panel;

each of the exterior portions of the head member, sill member, right side member and left side member having a respective exterior retainer attachment;

respective exterior retainers removably attachable to the respective exterior retainer attachments, each of exterior retainers having a gasket for contacting and retaining the glass panel;

each of the interior portions of the right side member and left side member having a respective interior retainer attachment;

respective interior retainers removably attachable to the respective interior retainer attachments, each of the interior retainers having a gasket for contacting and retaining the glass panel; and

wherein the window frame assembly is configured such that when the window frame is installed in the window framing and finish surround is installed around the installed window frame assembly, the window frame assembly has a frameless appearance, and the window frame is configured such that when the glass panel is installed into the window frame, there is an edge space between a top edge of the glass panel and the head member allowing the glass panel to be moved planarly upward to remove the glass panel from the window assembly without removing finish surround installed around the head member and sill member.

11. The window assembly of claim 10, wherein:

each of the exterior retainers and corresponding gasket extending substantially the full length of the respective frame member to which the respective exterior retainer is removably attachable; and

each of the interior retainers and corresponding gaskets extending substantially the length of the respective frame member to which the respective interior retainer is removably attachable.

12. The window assembly of claim 10, wherein:

each of the interior portions includes an interior wall having an inside edge and an outside edge and a first fastening wall extending laterally from the interior wall, each of the first fastening walls having one or more bosses for receiving fasteners for mounting the respective frame member to the window framing;

each of the exterior portions includes an exterior wall having an inside edge and an outside edge and a second fastening wall extending laterally from the interior wall, each of the second fastening walls having one or more bosses for receiving fasteners for mounting the respective frame member to the window framing; and

wherein each respective interior portion is connected to a respective exterior portion by connecting the respective first fastening wall of the interior portion to the respective second fastening wall of the exterior portion.

13. The window assembly of claim 12, wherein:

each of the respective interior portions is connected to a respective one of the exterior portions.

14. The window assembly of claim 12, wherein:

each of the respective interior portions is connected to a respective one of the exterior portions by connecting the respective first fastening wall of each interior portion to the respective second fastening wall of the exterior portion with a respective thermal break connector which thermally insulates the interior portion from the exterior portion.

15. The window assembly of claim 10, wherein:

the respective interior portion of the head member and sill member each further comprise a respective shelf portion, each of the shelf portions including a shelf wall extending interiorly from the interior wall of the first interior portion within the outside edge of the interior wall and a leg portion extending from an interior end of the shelf outward, each of the respective shelf walls having one or more bosses for receiving a fastener for mounting the respective frame member to the window framing.

16. The window assembly of claim 15, further comprising:

a fin member having a top end and a bottom end and extending a full height of the window frame, the fin member configured to be attached to the glass panel, the top end and bottom end of the fin member each having a plurality of bosses for receiving fasteners for mounting the fin member to the respective shelf portions of the interior portions of the head member and the sill member.

17. The window assembly of claim 16, wherein the fin member comprises a rectangular box beam and a pair of mounting feet extending from a first side of the rectangular box beam, wherein the first side and mounting feet are configured to be attached to the glass panel.

18. The window assembly of claim 17, wherein the fin member is configured to be attached to the glass panel using a structural sealant.

19. The window assembly of claim 10, further comprising:

a sill pan configured to receive the sill member and to collect water draining from the window assembly; and

one or more drains coupled to a bottom of the sill pan and in fluid communication with an interior of the sill pan for draining water from the sill pan.

20. The window assembly of claim **10**, further comprising:

a glass panel configured for being installed in the window frame with each of the retainers attached to the respective retainer attachment, such that each of the gaskets contacts and holds the glass panel in place in the window frame.

21. The window assembly of claim **20**, wherein the glass panel comprises a plurality of laterally spaced glass panes attached together edge to edge, and the window assembly further comprises:

a fin member having a top end and a bottom end and extending a full height of the window frame, the fin member attached to the glass panel, the top end and bottom end of the fin member each having a plurality of bosses which receive fasteners that mount the fin member to the respective interior portions of the head member and the sill member.

22. The window assembly of claim **10**, wherein:

the exterior retainers are selected from a selection of different exterior retainers, each different exterior retainer configured to accommodate a different thickness of glass pane in the window frame; and

the exterior retainer attachments are configured to receive each of the different exterior retainers.

23. The window assembly of claim **10**, wherein:

the window frame is configured such that when the glass panel is installed into the window frame, there is a respective edge space between respective edges of the glass panel and the right side member, and left side member allowing the glass panel to be moved planarly in the window frame;

the interior retainers of the right side member and left side member are configured to be removed from the respective right side member and left side member after the window assembly is installed in the wall framing and finished surround is installed around an interior of the right side member and left side member without removing the finished surround along the right side member and left side member, and

a glass panel comprising a plurality of end-long spaced glass panes attached together edge to edge installed in a window frame with finish surround installed around the interior of the right side member and left side member is removable from the window frame without removing the finish surround installed around the interior of the right side member and left side member.

24. The window assembly of claim **10**, wherein:

the window assembly is configured such that the glass panel when installed in the window assembly installed in the window framing with finish surround installed around the entire installed window assembly is removable from the installed window assembly without removing any of the finish surround and without breaking the glass panel.

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